NOAA TECHNICAL MEMORANDUM



NMFS-SEFSC-315

SPECIES COMPOSITION AND SIZE CLASS DISTRIBUTION OF MARINE TURTLE STRANDINGS ON THE GULF OF MEXICO AND SOUTHEAST UNITED STATES COASTS, 1985 - 1991

by

Wendy G. Teas

January 1993

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, FL 33149

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Teas, W.G. 1993. Species composition and size class distribution of marine turtle strandings on the Gulf of Mexico and southeast United States coasts, 1985 - 1991. NOAA Technical Memorandum NMFS-SEFSC-315, 43 pp.

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The Sea Turtle Stranding and Salvage Network (STSSN) was formally established by the National Marine Fisheries Service (NMFS), Miami Laboratory in 1980 to collect information on and document strandings of marine turtles along the U.S. Gulf of Mexico and Atlantic coasts. The network encompasses the coastal areas of the eighteen state region from Maine through Texas, and includes portions of the U.S. Caribbean (Puerto Rico and the U.S. Virgin Data are compiled through the efforts of network Islands). participants who document marine turtle strandings in respective areas and contribute those data to the centralized STSSN Effort expended in the collection of stranding data varies both geographically and temporally, with coverage ranging from systematic daily or weekly sampling in some areas to opportunistic reporting in others. Thus, strandings documented through the efforts of the STSSN should be considered minimum stranding figures, because they are reported strandings only, and not necessarily all stranding events.

Locations of strandings reported to the STSSN are computerized by regions in order to examine geographic distribution. Four regions are defined as follows: U.S. Gulf of Mexico - Texas, Louisiana, Mississippi, Alabama and Florida Gulf coast; southeast U.S. Atlantic - Florida Atlantic coast, Georgia, South Carolina and North Carolina; northeast U.S. Atlantic - Virginia, Maryland, Delaware, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire and Maine; Caribbean - Puerto Rico and U.S. Virgin Islands.

Regions are further broken down into statistical zones originally designed by the Bureau of Commercial Fisheries (now NMFS) for shrimp catch and effort data collection (Fig. 1). The actual coastal areas encompassed by each of the zones are not equal. There are 23 zones in the U.S. Gulf of Mexico. Zones 1 through 21 are numbered consecutively along the gulf coast from the Florida Keys to the Mexico border. Zones 24 and 25 are partial zones, shared with the southeast U.S. Atlantic region, and include the area west of longitude 80°30'. In the southeast U.S. Atlantic thirteen zones are defined based on the line of latitude which forms the southern boundary of the zone. Zones 24 and 25 are partial zones which include the area east of longitude 80°30'. is also a partial zone, ending at Carolina/Virginia border. Nine statistical zones are defined for the the northeast U.S. Atlantic beginning with the Virginia portion of zone 36 and continuing north through zone 44, ending at the Canadian border.

Strandings within each zone are finally classified as inshore or offshore. Offshore strandings are defined as strandings occurring on ocean beaches; inshore strandings are those which occur landward of the ocean coastline, primarily in rivers, bays and sounds.

In 1987, systematic sampling was implemented via ground and/or aerial surveys in select statistical zones in order to develop an index of mortality which could be compared spatially and temporally. Statistical zones 17-21 and 4-5 in the U.S. Gulf of Mexico and 28-32 in the southeast U.S. Atlantic have been included in this study (Fig. 1). This systematic sampling regime, conducted only along the offshore areas of these zones, provides an index of total mortality when standardized for effort. Preliminary results of systematic sampling for stranded sea turtles are presented by Thompson and Martinez (1990).

MATERIALS AND METHODS

This report focuses on strandings which occurred in the U.S. Gulf of Mexico and southeast U.S. Atlantic regions from 1985 through 1991. Analysis was limited to 1985-1991 because data collection efforts were relatively synoptic during this time period. Prior to 1985, data collection efforts were often sporadic along the entire U.S. Gulf and Atlantic coasts. Results of the STSSN from 1986 through the present are summarized in a series of annual reports (Schroeder 1987, Schroeder and Warner 1988, Teas and Martinez 1989, Teas and Martinez 1992, Teas 1992a, Teas 1992b).

All five species known to inhabit the waters of the Gulf of Mexico and U.S. Atlantic were analyzed, these include: loggerheads (Caretta caretta), greens (Chelonia mydas), Kemp's ridleys (Lepidochelys kempi), hawksbills (Eretmochelys imbricata) and leatherbacks (Dermochelys coriacea). Only true strandings (dead or weak turtles which wash ashore or are found floating) of wild turtles for which species was positively identified and measurements were taken are included in this report. Strandings of headstarted turtles are not included since their stranding may be an artifact of captive rearing and release.

The U.S. Gulf of Mexico was subdivided into eastern (zones 1-12, 24 and 25) and western (zones 13-21) portions based on species composition differences noted in aerial surveys (Fritts et al. 1983, Thompson, et al. 1991.)

For the purposes of seasonal analysis, seasons were defined as follows: winter (December through February), spring (March through May), summer (June through August), fall (September through November).

Carapace lengths of stranded turtles were measured with calipers (straight length) or with flexible measuring tape (curved length) or both. If straight length was measured, this measurement was used in the analysis. If only curved measurements were taken, curved carapace lengths (CCL) were converted to straight carapace lengths (SCL) for size classification. Conversions were based on simple linear regressions of paired SCL and CCL data points from

turtles with both SCL and CCL measurements for all species except leatherbacks. For leatherbacks, functional regressions were performed on paired SCL and CCL data points in an effort to obtain a better fit on this small sample size. Regression equations for each species are as follows:

Loggerhead

SCL =
$$-1.442 + (0.948 \times CCL)$$

(N = 932, $r^2 = 0.97$, P = 0.0000)

Green

SCL =
$$0.294 + (0.937 \times CCL)$$

N = $690, r^2 = 0.99, P = 0.0000)$

Kemp's Ridley

SCL = 0.013 + (0.945 x CCL)
(N = 305,
$$r^2$$
 = 0.99, P = 0.0000)

Hawksbill

SCL =
$$-0.212 + (0.955 \times CCL)$$

(N = 55, $r^2 = 0.99$, P = 0.0001)

Leatherback

LogSCL =
$$0.355 + (0.921 \times LogCCL)$$

(N = 29, $r^2 = 0.96$, P = 0.0001)

Size classes were broken down into nineteen 10-cm intervals, ranging from 0.0 - 9.9 cm to 180.0 - 189.9 cm. A summary of straight carapace length measurements of marine turtle strandings by region is presented in Table 1.

DISCUSSION

Regional Distribution

In the southeast U.S. Atlantic, 6,684 marine turtle strandings were identified and measured between 1985 and 1991. Of these, 5,818 (87.0%) were offshore strandings and 866 (13.0%) were inshore strandings (Fig. 2, Table 2). The majority of offshore strandings were loggerheads with 4,675 (69.9%) being reported. Green turtles accounted for 630 offshore reports (9.4%), Kemp's ridleys 277 (4.1%), leatherbacks 190 (2.8%) and hawksbills 46 (0.7%). Inshore strandings were more equally distributed with loggerheads

accounting for 413 (6.2%) and green turtles 406 (6.1%). Kemp's ridleys, leatherbacks and hawksbills accounted for 29 (0.4%), 12 (0.2%) and 6 (0.1%) of the inshore total, respectively.

A total of 1,248 marine turtle strandings were identified and measured between 1985 and 1991 in the eastern U.S. Gulf of Mexico. Offshore strandings accounted for 71.4% (891) and inshore strandings accounted for 28.6% (357) of the total (Fig. 3, Table 3). Loggerheads accounted for 680 offshore strandings (54.5%), followed by green turtles 129 (10.3%), Kemp's ridleys 63 (5.0%), leatherbacks 12 (1.0%) and hawksbills 7 (0.6%). Inshore strandings consisted of 188 loggerheads (15.1%), 115 green turtles (9.2%), 48 Kemp's ridleys (3.8%), 5 hawksbills (0.4%) and 1 leatherback (0.1%).

Between 1985 and 1991 in the western U.S. Gulf of Mexico, 1,628 marine turtles were identified and measured. Of these, 89.4% (1456) were offshore strandings and 10.6% (172) were inshore strandings (Fig. 4, Table 4). Offshore, loggerheads accounted for 45.0% (732) of the total followed closely by Kemp's ridleys comprising 34.1% (555). Hawksbills, green turtles and leatherbacks accounted for 95 (5.8%), 47 (2.9%) and 27 (1.7%) of the offshore total, respectively. Green turtles were the most frequently stranded species inshore, accounting for 4.1% (66), followed by Kemp's ridleys 3.4% (56), loggerheads 2.4% (39), hawksbills 0.6% (10) and leatherbacks 0.1% (1).

Species Distribution

Loggerhead

A total of 6,727 loggerhead turtle strandings are included in this analysis, with 5,088 reported from the southeast U.S. Atlantic (91.9% offshore, 8.1% inshore) (Table 5), 868 from the eastern U.S. Gulf of Mexico (78.3% offshore, 21.7% inshore) (Table 6) and 771 from the western U.S. Gulf of Mexico (94.9% offshore, 5.1% inshore) (Table 7). In the southeast U.S. Atlantic, 52% of the loggerhead strandings reported were between 50.0 and 69.9 cm in length (Fig. Loggerhead strandings occurred during all seasons with 45% being reported during the summer, 24% during the spring, 21% during the fall and 9% during the winter (Fig. 6). In the eastern U.S. Gulf of Mexico, over 70% of stranded loggerheads were greater than 80 cm in length (57.0% offshore, 14.1% inshore) Loggerhead strandings occurred during all seasons in the eastern U.S. Gulf of Mexico with 49% occurring in the spring, 28% in the summer, 13% in the winter and 10% in the fall (Fig. 8). western U.S. Gulf of Mexico, 55% of loggerhead strandings were between 50.0 and 69.9 cm in length (Fig. 9). Strandings occurred during all seasons with 47% washing ashore in the spring, 24% in the summer, 18% in the fall and 11% in the winter (Fig. 10).

Green

Strandings of green turtles totaled 1,393, with 1,036 occurring in the southeast U.S. Atlantic (60.8% offshore, 39.2% inshore) (Table 8), 244 in the eastern U.S. Gulf of Mexico (52.9% offshore, 47.1% inshore) (Table 9), and 113 in the western U.S. Gulf of Mexico (41.6% offshore, 58.4% inshore) (Table 10). In the southeast U.S. Atlantic, offshore strandings peaked in the 30.0 - 39.9 cm size class (25%) while inshore strandings were generally in the 40.0 -59.9 cm range (20%) (Fig. 11). Offshore strandings were common during all seasons (winter 15%, spring 22%, summer 15%, fall 10%) while inshore strandings occurred most often during the winter (30%), primarily as a result of cold-stunning (Fig. 12). majority of these cold-stun strandings occurred during December 1989 when over 200 green turtles were affected by a severe drop in temperature in northeastern Florida. In the eastern U.S. Gulf of Mexico, inshore strandings peaked in the 40.0 - 49.9 cm size class (18%) while offshore strandings were slightly larger in the 50.0 -59.9 cm size class (15%) (Fig. 13). Strandings occurred during all seasons with 42% being reported in the winter, 26% in the spring, 13% in the summer and 18% in the fall (Fig. 14). In the western U.S. Gulf of Mexico, the majority of offshore strandings occurred in the 20.0 - 29.9 cm size class (19%). Inshore strandings were generally larger with most being 30.0 - 49.9 cm in length (25%) Strandings occurred in all seasons with 50% being reported during the winter (6% offshore, 44% inshore), 27% during the spring (21% offshore, 6% inshore), 14% during the summer (9% offshore, 5% inshore) and 11% during the fall (6% offshore, 5% inshore) (Fig. 16). The majority of the inshore strandings in the winter occurred during February 1989 after a severe drop in temperature on the lower Texas coast.

Kemp's Ridley

A total of 1,028 Kemp's ridley strandings were reported, with 306 occurring in the southeast U.S. Atlantic (90.5% offshore, 9.5 % inshore) (Table 11), 111 in the eastern U.S. Gulf of Mexico (56.8% offshore, 43.2% inshore) (Table 12) and 611 in the western U.S. Gulf of Mexico (90.8% offshore, 9.2% inshore) (Table 13). southeast U.S. Atlantic, the majority of Kemp's ridley strandings were in the 30.0 - 39.9 cm size class, both inshore (5%) and offshore (38%) (Fig. 17). Strandings occurred during all seasons with 39% being reported in the fall, 23% in the winter, 21% in the summer and 17% in the spring (Fig. 18). Kemp's ridley strandings in the eastern U.S. Gulf of Mexico were almost equally divided inshore (43%) and offshore (57%), with 20.0 - 39.9 cm turtles predominating inshore and 40.0 - 59.9 cm turtles predominating offshore (Fig. 19). Strandings were reported in all seasons with 31% occurring during the spring, 26% during the summer, 25% during the winter and 18% during the fall (Fig. 20). In the western U.S. Gulf of Mexico, Kemp's ridley strandings peaked in the 30.0 - 39.9 cm size class both inshore (3%) and offshore (26%). A secondary peak occurs in offshore strandings in the 50.0 - 69.9 cm size

range, accounting for 29% of the strandings in this region (Fig. 21). Kemp's ridley strandings were reported during all seasons, with 38% occurring during the summer, 36% during the spring, 21% during the fall and 6% during the winter (Fig. 22).

Hawksbill

Strandings of hawksbill turtles totaled 169, with 52 occurring in the southeast U.S. Atlantic (88.5% offshore, 11.5% inshore) (Table 14), 12 in the eastern U.S. Gulf of Mexico (58.3% offshore, 41.7% inshore) (Table 15) and 105 in the western U.S. Gulf of Mexico (90.5% offshore, 9.5% inshore) (Table 16). In the southeast U.S. Atlantic, 56% of hawksbill strandings were between 10.0 and 29.9 cm Offshore strandings occurred in all seasons (winter 19%, spring 31%, summer 21%, fall 17%) while inshore strandings were reported in the winter (2%), spring (8%) and summer (2%) (Fig. 24). Both inshore and offshore hawksbill strandings in the eastern U.S. Gulf of Mexico peaked in the 20.0 - 29.9 cm size class (Fig. Both inshore and offshore strandings occurred during the winter (50%) and summer (25%), while only offshore strandings were reported in the spring (8%) and only inshore strandings were reported in the fall (17%) (Fig. 26). Over 62% of hawksbills washing ashore in the western U.S. Gulf of Mexico were weak posthatchlings in the 0.0 to 9.9 cm size class (Fig. 27). Hawksbill strandings in the western U.S. Gulf of Mexico are most often reported during the summer (45%) and fall (43%), with 7% and 6% being reported during the winter and spring, respectively (Fig. 28).

<u>Leatherback</u>

A total of 243 leatherback strandings were reported, with 202 occurring in the southeast U.S. Atlantic (94.1% offshore, 5.9% inshore) (Table 17), 13 in the eastern U.S. Gulf of Mexico (92.3% offshore, 7.7% inshore) (Table 18) and 28 in the western U.S. Gulf of Mexico (96.4% offshore, 3.6% inshore) (Table 19). Over half of all leatherback strandings in the southeast U.S. Atlantic were Three strandings of postbetween 140.0 - 159.9 cm (Fig. 29). hatchling leatherbacks (10.0 - 29.9 cm size range) were reported from this region, all in the summer or fall. Strandings were reported during all seasons with 50% occurring in the spring, 27% in the fall, 15% in the winter and 8% in the summer (Fig. 30). Strandings in the eastern U.S. Gulf of Mexico peaked in the 150 -159.9 cm size class. Only one leatherback turtle was reported from inshore waters in this region (Fig. 31). Leatherback strandings in the eastern U.S. Gulf of Mexico occurred during the spring (46%) and summer seasons (54%) (Fig. 32). In the western U.S. Gulf of Mexico, 68% of leatherback strandings ranged from 110.0 to 139.9 cm and occurred in offshore waters. A single stranded leatherback was reported from inshore waters in this region (Fig. 33). Strandings occurred predominantly in the spring (64%) and summer (32%) months, with a single stranding being reported in the fall (4%) (Fig. 34).

CONCLUSIONS

The southeast U.S. Atlantic region appears to be an important year round habitat for juvenile through adult loggerheads and greens in both offshore and inshore waters. Kemp's ridleys, hawksbills and leatherbacks are also found year round, primarily utilizing offshore areas.

The eastern U.S. Gulf of Mexico is unique in that it appears to support a very large percentage of sub-adult and adult loggerheads during the spring and summer months, especially offshore along the south Florida coast. Juvenile to adult greens and Kemp's ridleys utilize both inshore and offshore waters extensively during all seasons. Hawksbills, although few in number, also utilize both inshore and offshore areas. Leatherbacks utilize this area primarily during the spring and fall as they migrate through to preferred feeding and nesting grounds.

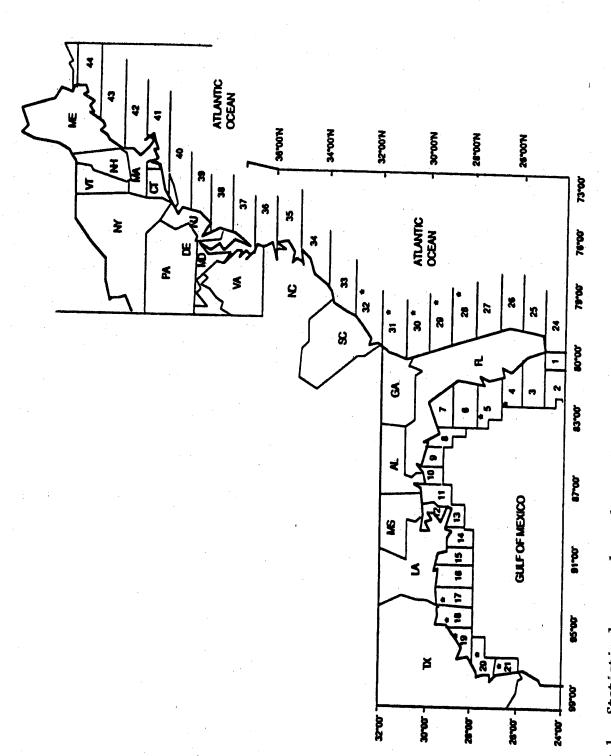
The western U.S. Gulf of Mexico provides year round habitat for juvenile to sub-adult loggerheads and hatchling to adult Kemp's ridleys, primarily in offshore waters. Juvenile to sub-adult greens utilize both inshore and offshore waters throughout all seasons. Hatchling to juvenile hawksbills are common, primarily in offshore waters, during the summer and fall as prevailing water currents carry them into this area. Leatherbacks, as in the eastern U.S. Gulf of Mexico, are found as they migrate through this area in the spring and fall.

<u>ACKNOWLEDGEMENTS</u>

I would like to thank all of the dedicated STSSN participants and state coordinators who have worked so hard over the years to gather the data contained in this report. Thanks also to Anthony Martinez, NMFS/Miami for his computer programming expertise and assistance in summarizing the data and to Brenda Smith, NMFS/Miami for her patient assistance with table preparation and report format. Special thanks go to Wayne Witzell and Nancy Thompson, both of NMFS/Miami, who reviewed early drafts and made helpful suggestions during the preparation of this report.

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Statistical zones along the southeast U.S. Atlantic and U.S. Gulf of Mexico coasts. (Zones denoted by asterisk were included in systematic surveys.) Figure 1.

Straight carapace lengths of marine turtle strandings reported along the southeast U.S. Atlantic and U.S. Gulf of Mexico coasts, 1985 - 1991. Table 1.

Wrighter and the					
	Number	Average SCL (cm)	Minimum SCL (cm)	Maximum SCL (cm)	Standard Deviation (cm)
SOUTHEAST U.S. ATLANTIC	6003	68.7	3.4	121.9	16.5
Caretta caretta	2000	7.07	7.7	113.5	15.5
Chelonia mydas	1036	1.77	00	67.2	9.4
Lepidochelys kempi	306	38.6	00	8	20.3
Fretmochelys implicata	52	30.0	7.0	6.70	2.70
Literation and	2002	144.1	12.1	183.8	C.12
Dermochelys coriacea	707				
EASTERN U.S. GULF OF MEXICO		03.2	4.7	121.3	16.1
Caretta caretta	& &	7.60		1003	14.2
Chelonia mydas	244	46.3	16.0		12.0
	111	43.5	14.7	80.8);;;
Lepidochetys Kempi	-	27.8	5.6	66.4	17.5
Eretmochetys imbricata	71	0.12	3 301	1680	8.1
Dermochelys coriacea	13	150.0	C.CCI		
WESTERN U.S. GULF OF MEXICO				0.000	16.8
***************************************	77.1	64.6	3.2	107.0	
Caretta caretta	113	40.2	13.0	99.2	15.5
Chelonia mydas		38.3	4.1	70.9	17.2
Lepidochetys kempi	011	50.5	5.2	46.1	9.2
Eretmochelys imbricata	105	13.3	310	156.6	13.8
Demochelys coriacea	78	130.9	102.9	130.0	
Delinoriety column					

Southeast U.S. Atlantic Species Composition

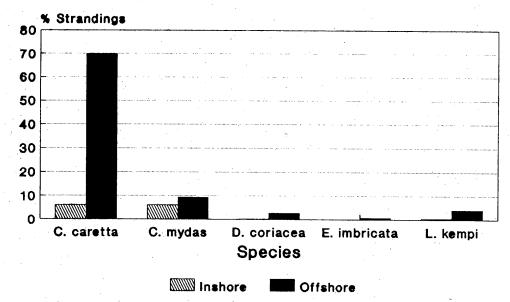


Figure 2. Species composition of stranded marine turtles on the southeast U.S. Atlantic coast, 1985 - 1991.

Table 2. Species composition of stranded marine turtles on the southeast U.S. Atlantic coast, 1985 - 1991.

	Ins	hore	Off	shore
Species	Number	Percent	Number	Percent
Caretta caretta	413	6.2%	4675	69.9%
Chelonia mydas	406	6.1%	630	9.4%
Dermochelys coriacea	12	0.2%	190	2.8%
Eretmochelys imbricata	6	0.1%	46	0.7%
Lepidochelys kempi	29	0.4%	277	4.1%
Total	866	13.0%	5818	87.0%

Eastern U.S. Gulf of Mexico Species Composition

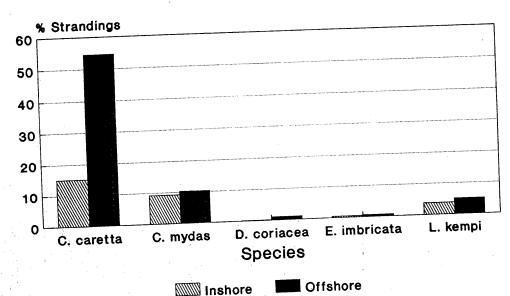
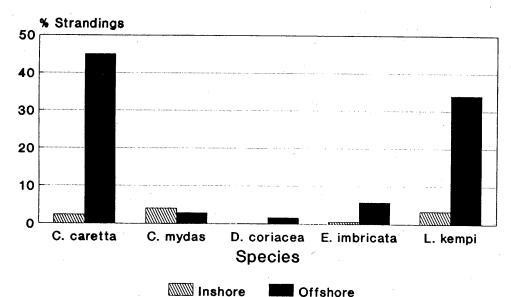


Figure 3. Species composition of stranded marine turtles on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

Table 3. Species composition of stranded marine turtles on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

	Ins	hore	Offs	shore
Species	Number	Percent	Number	Percent
Caretta caretta	188	15.1%	680	54.5%
	115	9.2%	129	10.3%
Chelonia mydas	1	0.1%	12	1.0%
Dermochelys coriacea	- 5	0.4%	7	0.6%
Eretmochelys imbricata	48	3.8%	63	5.0%
Lepidochelys kempi		28.6%	89Í	71.4%
Total	357	28.070		

Western U.S. Gulf of Mexico Species Composition



ire 4. Species composition of stranded marine turtles on the western U.S. Gulf of Mexico coast, 1985 - 1991.

e 4. Species composition of stranded marine turtles on the western U.S. Gulf of Mexico coast, 1985 - 1991.

	Ins	shore	Off	shore
Species	Number	Percent	Number	Percent
Caretta caretta	39	2.4%	732	45.0%
Chelonia mydas	66	4.1%	47	2.9%
Dermochelys coriacea	1	0.1%	27	1.7%
Eretmochelys imbricata	10	0.6%	95	5.8%
Lepidochelys kempi	56	3.4%	555	34.1%
Total	172	10.6%	1456	89.4%

Caretta caretta Southeast U.S. Atlantic

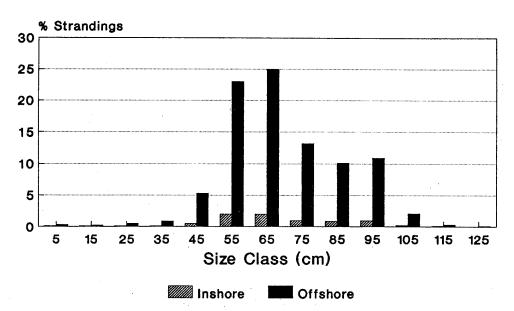
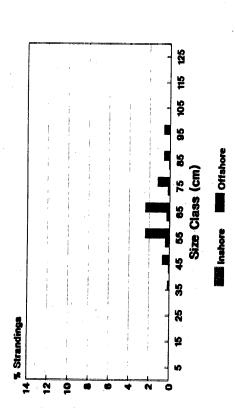


Figure 5. Size distribution of stranded loggerheads (<u>Caretta caretta</u>) on the southeast U.S. Atlantic coast, 1985 - 1991.

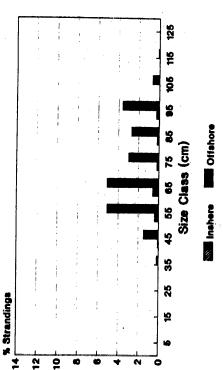
Table 5. Size distribution of stranded loggerheads (<u>Caretta caretta</u>) on the southeast U.S. Atlantic coast, 1985 - 1991.

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	STATE OF THE STATE OF	Inshore	4		Offshore	·
. ve C"tekset (⊜mm))	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
	3.	7.2	0.1%	14	6.6	0.3%
(9) 9)	400	13.9	0.1%	9	14.4	0.2%
(9)	2	26.8	0.1%	24	26.7	0.5%
397.2	5	35.4	0.1%	44	35.5	0.9%
(.)	26	46.9	0.5%	272	47.0	5.3%
-19.0°	102	55.4	2.0%	1172	55.7	23.0%
이 글 59.69	104	64.2	2.0%	1273	64.2	25.0%
/900 = 79 .9	52	73.7	1.0%	670	74.4	13.2%
<u> </u>	47	85.3	0.9%	513	84.9	10.1%
90.0 - 99.9	51	94.2	1.0%	557	94.0	10.9%
100.0 - 109.9	12	104.0	0.2%	106	103.5	2.1%
110.0 - 119.0	5	115.9	0.1%	16	113.0	0.3%
120.0 - 129.9	0			5	121.4	0.1%
Total	413	·	8.1%	4675		91.9%

Caretta caretta Southeast U.S. Atlantic - Winter



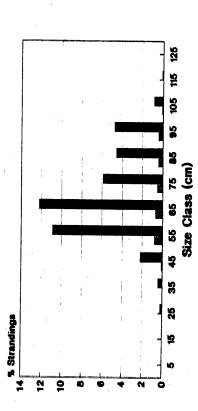
Caretta caretta Southeast U.S. Atlantic - Spring



Caretta caretta Southeast U.S. Atlantic - Fall

Southeast U.S. Atlantic - Summer

Caretta caretta



Seasonal size distribution of stranded loggerheads (Caretta caretta) on the southeast U.S. Atlantic coast, 1985 - 1991. Figure 6.

Inshore Offshere

Caretta caretta Eastern U.S. Gulf of Mexico

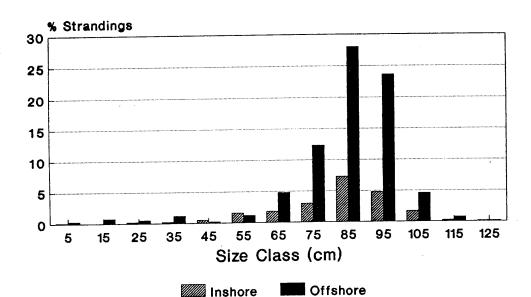
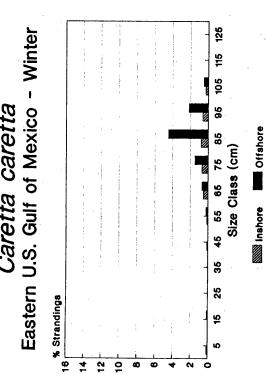


Figure 7. Size distribution of stranded loggerheads (<u>Caretta caretta</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

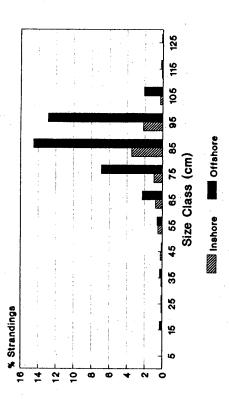
Table 6. Size distribution of stranded loggerheads (<u>Caretta caretta</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

		Inshore		·	Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	1	4.7	0.1%	3	7.4	0.3%
10.0 - 19.9	0			7	14.7	0.8%
20.0 - 29.9	2	26.7	0.2%	4	28.2	0.5%
30.0 - 39.9	2	35.0	0.2%	10	34.3	1.2%
40.0 - 49.9	4	43.1	0.5%	2	43.2	0.2%
50.0 - 59.9	14	55.6	1.6%	10	54.9	1.2%
60.0 - 69.9	16	64.4	1.8%	42	66.0	4.8%
70.0 - 79.9	26	74.4	3.0%	107	75.7	12.3%
80.0 - 89.9	63	85.6	7.3%	243	85.3	28.0%
90.0 - 99.9	42	94.3	4.8%	205	93.9	23.6%
100.0 - 109.9	15	103.5	1.7%	40	102.5	4.6%
110.0 - 119.9	2	113.0	0.2%	6	111.3	0.7%
120.0 - 129.9	1	121.3	0.1%	1	121.3	0.1%
Total	188		21.7%	680		78.3%

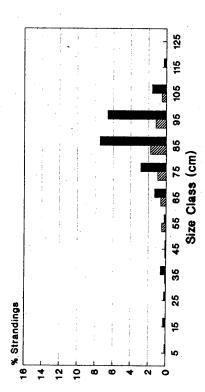
Caretta caretta



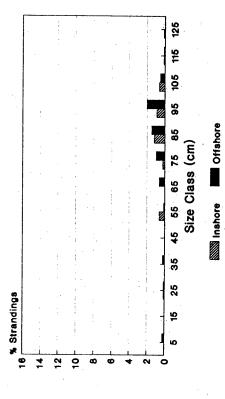
Eastern U.S. Gulf of Mexico - Spring Caretta caretta



Eastern U.S. Gulf of Mexico - Summer Caretta caretta



Eastern U.S. Gulf of Mexico - Fall Caretta caretta



Seasonal size distribution of stranded loggerheads (Garetta caretta) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991. Figure 8.

Offshore

Inshore

Caretta caretta Western U.S. Gulf of Mexico

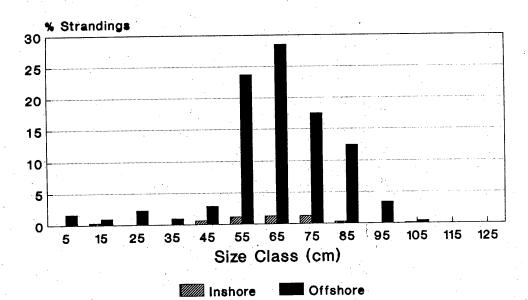
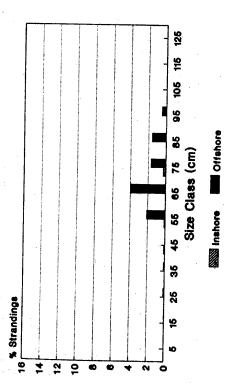


Figure 9. Size distribution of stranded loggerheads (<u>Caretta caretta</u>) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

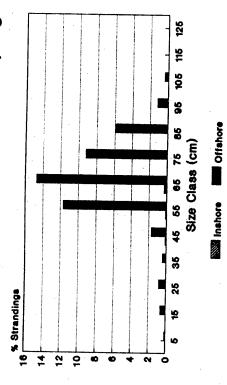
Table 7. Size distribution of stranded loggerheads (<u>Caretta caretta</u>) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

		Inshore			Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			13	4.7	1.7%
10.0 - 19.9	2	13.6	0.3%	. 8	12.8	1.0%
20.0 - 29.9	0			18	25.9	2.3%
30.0 - 39.9	.0			8	34.7	1.0%
40.0 - 49.9	5	45.5	0.6%	22	47.1	2.9%
50.0 - 59.9	9	58.5	1.2%	183	56.0	23.7%
60.0 - 69.9	10	64.8	1.34	220	64.7	28.5%
70.0 - 79.9	10	73.7	1.3%	135	74.7	17.5%
80.0 - 89.9	2	83.9	0.3%	96	84.4	12.5%
90.0 - 99.9	0			26	93.6	3.4%
100.0 - 109.9	1	107.0	0.1%	3	103.3	0.4%
110.0 - 119.9	0			0		
120.0 - 129.9	0		No.	0		
Total	39		5.1%	732		94.9%

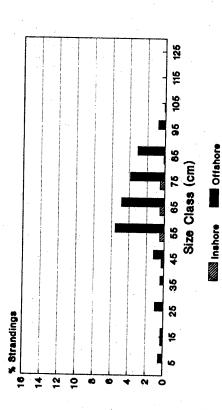
Caretta caretta Western U.S. Gulf of Mexico - Winter



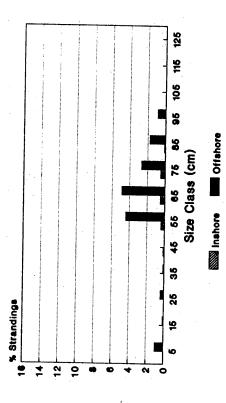
Caretta caretta Western U.S. Gulf of Mexico - Spring



Caretta caretta Western U.S. Gulf of Mexico - Summer



Caretta caretta Western U.S. Gulf of Mexico - Fall



Seasonal size distribution of stranded loggerheads (Caretta caretta) on the western U.S. Gulf of Mexico coast, 1985 - 1991. Figure 10.

Chelonia mydas Southeast U.S. Atlantic

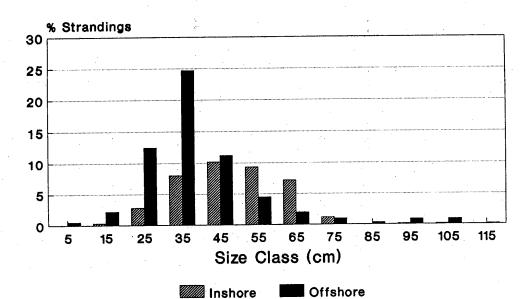
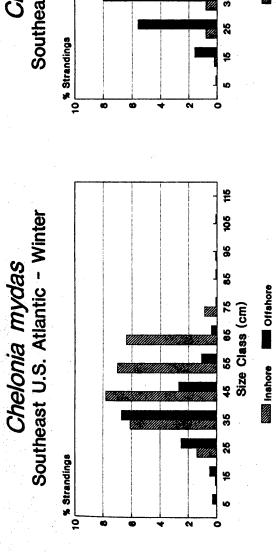


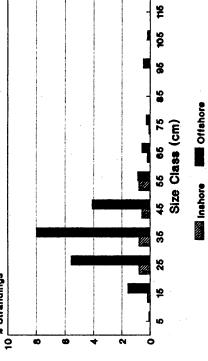
Figure 11. Size distribution of stranded greens (Chelonia mydas) on the southeast U.S. Atlantic coast, 1985 - 1991.

Table 8. Size distribution of stranded greens (Chelonia mydas) on the southeast U.S. Atlantic coast, 1985 - 1991.

		Inshore			Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			5	8.6	0.5%
10.0 - 19.9	3	16.5	0.3%	23	15.8	2.2%
20.0 - 29.9	29	27.0	2.8%	130	27.1	12.5%
30.0 - 39.9	83	35.1	8.0%	256	34.4	24.7%
40.0 - 49.9	106	44.6	10.2%	116	44.4	11.2%
50.0 - 59.9	96	54.7	9.3%	47	54.0	4.5%
60.0 - 69.9	75	63.9	7.2%	21	63.3	2.0%
70.0 - 79.9	12	73.4	1.2%	10	73.4	1.0%
80.0 - 89.9	0			3	83.3	0.3%
90.0 - 99.9	1	91.4	0.1%	9	95.9	0.9%
100.0 - 109.9	1	100.3	0.1%	9	102.2	0.9%
110.0 - 119.9	0			1	113.5	0.1%
Total	406		39.2%	630		60.8%



Chelonia mydas Southeast U.S. Atlantic - Spring

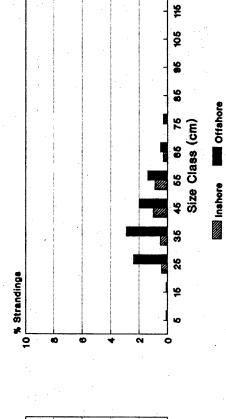


Chelonia mydas Southeast U.S. Atlantic - Fall

Southeast U.S. Atlantic - Summer

% Strandings

Chelonia mydas



Seasonal size distribution of stranded greens (Chelonia mydas) on the southeast U.S. Atlantic coast, 1985 - 1991. Figure 12.

Inshore Offshore

Size Class (cm)

Chelonia mydas Eastern U.S. Gulf of Mexico

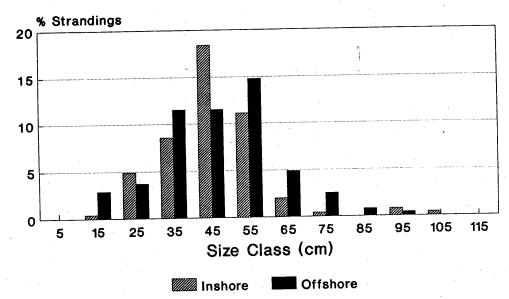
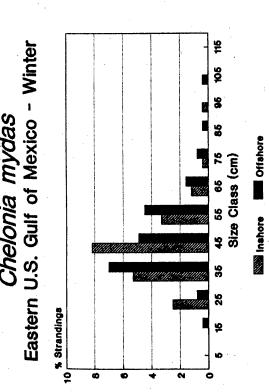


Figure 13. Size distribution of stranded greens (Chelonia mydas) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

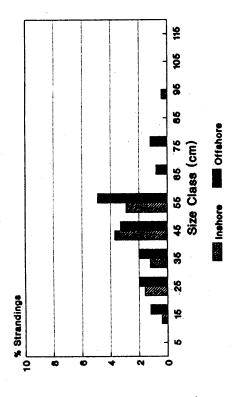
Table 9. Size distribution of stranded greens (Chelonia mydas) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

				*		
		Inshore			Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			0		
10.0 - 19.9	1	17.6	0.4%	7	16.0	2.9%
20.0 - 29.9	12	26.4	4.9%	9	25.4	3.7%
30.0 - 39.9	21	35.8	8.6%	28	36.5	11.5%
40.0 - 49.9	45	44.8	18.4%	28	45.5	11.5%
50.0 - 59.9	27	54.0	11.1%	36	54.3	14.8%
60.0 - 69.9	5	63.3	2.0%	12	64.3	4.9%
70.0 - 79.9	1	76.2	0.4%	6	72.9	2.5%
	0	7002		2	84.9	0.8%
	2	91.7	0.8%	1	91.4	0.4%
	1	100.3	0.4%	0		
100.0 - 109.9	0	100.5		0		
110.0 - 119.9			47.18	129		52.9%
Total	115		47.1%	123		32.38

Chelonia mydas

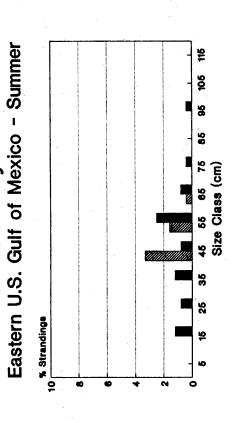


Eastern U.S. Gulf of Mexico - Spring Chelonia mydas



Eastern U.S. Gulf of Mexico - Fall Chelonia mydas

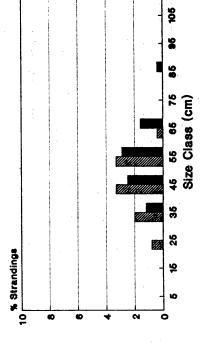
Chelonia mydas



Seasonal size distribution of stranded greens (Chelonia mydas) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991. Figure 14.

Inshore Offshore

Inshore Offshore



Chelonia mydas Western U.S. Gulf of Mexico

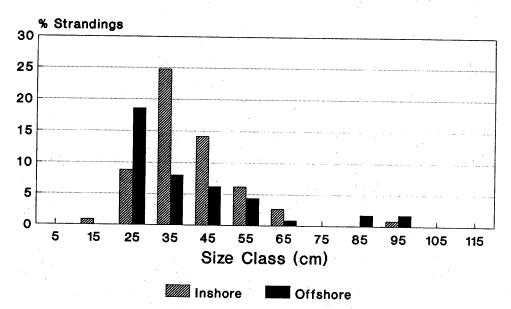
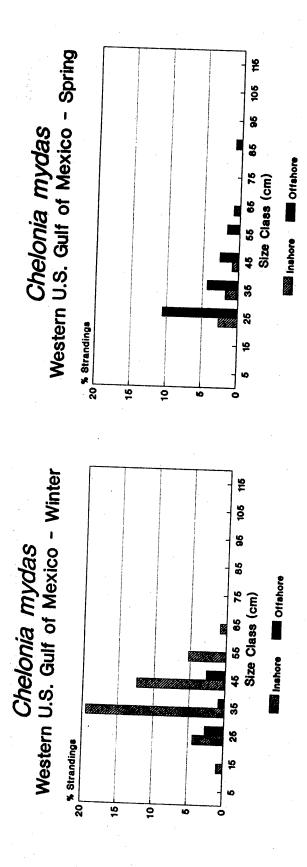
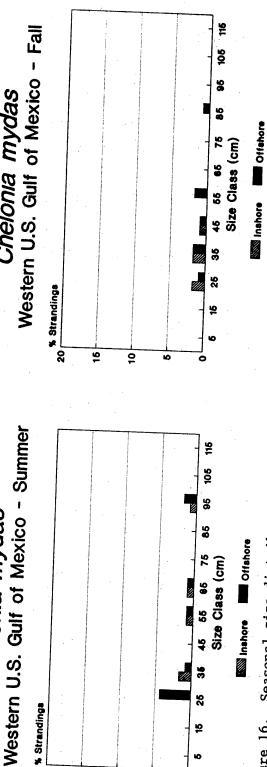


Figure 15. Size distribution of stranded greens (Chelonia mydas) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

Table 10. Size distribution of stranded greens (Chelonia mydas) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

						<u> </u>
		Inshore			Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			0		
10.0 - 19.9	1	13.0	0.9%	0		
20.0 - 29.9	10	26.7	8.8%	21	26.6	18.6%
30.0 - 39.9	28	35.4	24.8%	9	33.8	8.0%
40.0 - 49.9	16	45.9	14.2%	7	44.6	6.2%
50.0 - 59.9	7	54.4	6.2%	5	54.7	4.4%
60.0 - 69.9	3	65.0	2.7%	1	60.4	0.9%
70.0 - 79.9	0			0		
80.0 - 89.9	0			2	84.7	1.8%
90.0 - 99.9	1	98.5	0.9%	2	95.4	1.8%
100.0 - 109.9	0			0		
110.0 - 119.9	0			0		
Total	66		58.4%	47		41.6%





Chelonia mydas

Chelonia mydas

% Strandings

15

10

Seasonal size distribution of stranded greens (Chelonia mydas) on the western U.S. Gulf Figure 16.

Lepidochelys kempi Southeast U.S. Atlantic

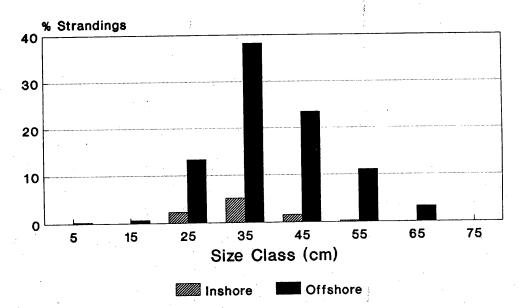
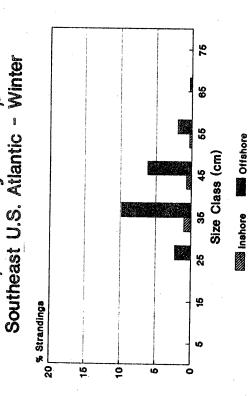


Figure 17. Size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the southeast U.S. Atlantic coast, 1985 - 1991.

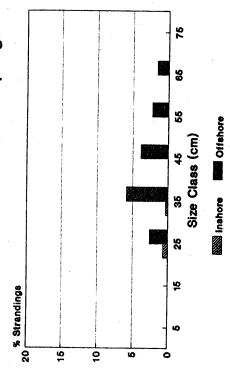
Table 11. Size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the southeast U.S. Atlantic coast, 1985 - 1991.

		Inshore			Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			1	8.9	0.3%
10.0 - 19.9	0			2	15.2	0.7%
20.0 - 29.9	7	26.4	2.3%	41	26.7	13.4%
30.0 - 39.9	16	35.0	5.2%	117	35.0	38.2%
40.0 - 49.9	5	41.9	1.6%	72	43.8	23.5%
50.0 - 59.9	1	51.0	0.3%	34	52.8	11.1%
60.0 - 69.9	0	·		10	61.8	3.3%
70.0 - 79.9	0			0		
Total	29		9.5%	277		90.5%



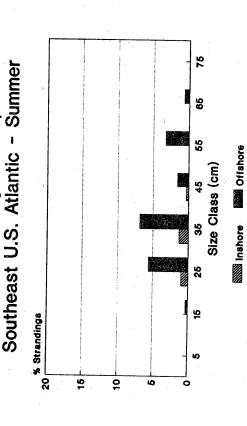


Southeast U.S. Atlantic - Spring Lepidochelys kempi



Lepidochelys kempi Southeast U.S. Atlantic - Fall

Lepidochelys kempi



Inshore Offshore Size Class (cm) % Strandings 5 5

Seasonal size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the southeast U.S. Atlantic coast, 1985 - 1991. Figure 18.

Lepidochelys kempi Eastern U.S. Gulf of Mexico

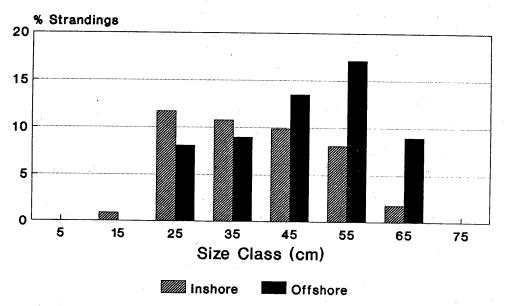
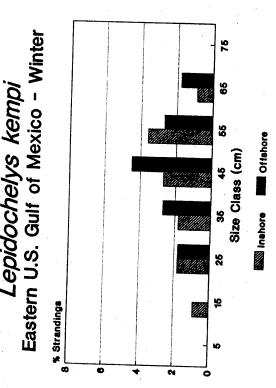


Figure 19. Size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

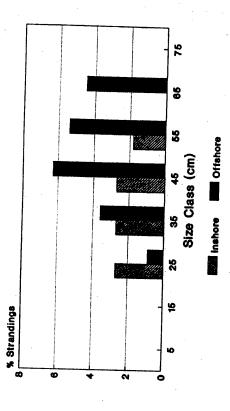
Table 12. Size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

		Inshore			Offshore	
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			0		
10.0 - 19.9	1	14.7	0.9%	0		
20.0 - 29.9	13	26.5	11.7%	9	26.5	8.1%
30.0 - 39.9	12	34.3	10.8%	10	34.1	9.0%
40.0 - 49.9	11	44.3	9.9%	15	46.0	13.5%
50.0 - 59.9	9	54.5	8.1%	19	55.2	17.1%
60.0 - 69.9	2	64.5	1.8%	10	63.2	9.0%
70.0 - 79.9	0			. 0		
Total	48		43.2%	63		56.8%

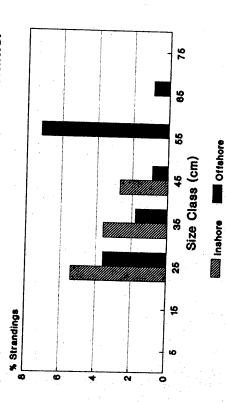
Lepidochelys kempi



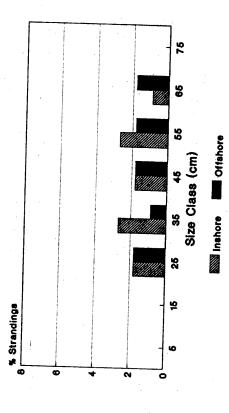
Eastern U.S. Gulf of Mexico - Spring Lepidochelys kempi



Eastern U.S. Gulf of Mexico - Summer Lepidochelys kempi



Lepidochelys kempi Eastern U.S. Gulf of Mexico - Fall



Seasonal size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991. Figure 20.

Lepidochelys kempi Western U.S. Gulf of Mexico

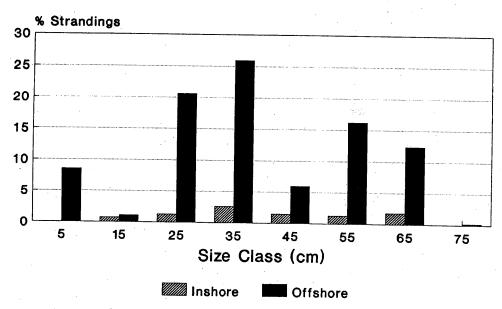
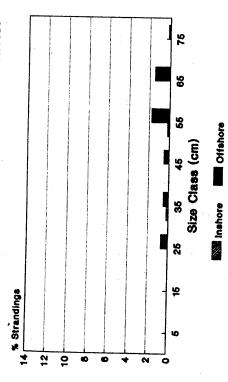


Figure 21. Size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

Table 13. Size distribution of stranded Kemp's ridleys (Lepidochelys kempi) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

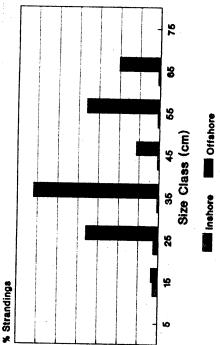
	Inshore			Offshore		
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			52	5.1	8.5%
10.0 - 19.9	4	18.0	0.7%	7	18.5	1.1%
20.0 - 29.9	8	27.7	1.3%	126	25.7	20.6%
30.0 - 39.9	16	35.2	2.6%	158	33.9	25.9%
40.0 - 49.9	9	41.8	1.5%	36	44.1	5.9%
50.0 - 59.9	8	55.2	1.3%	99	56.5	16.2%
60.0 - 69.9	11	62.2	1.8%	76	63.0	12.4%
70.0 - 79.9	0			1	70.9	0.2%
Total	56		9.2%	555		90.8%

Lepidochelys kempi Western U.S. Gulf of Mexico - Winter



9

Lepidochelys kempi Western U.S. Gulf of Mexico - Spring



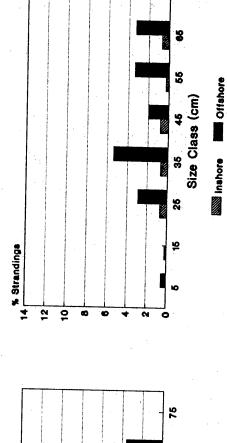
Lepidochelys kempi Western U.S. Gulf of Mexico - Fall

Western U.S. Gulf of Mexico - Summer

% Strandings

5

Lepidochelys kempi



Seasonal size distribution of stranded Kemp's ridleys (<u>Lepidochelys kempi</u>) on the western U.S. Gulf of Mexico coast, 1985 - 1991. Figure 22.

Inshore Offshore

Size Class (cm)

Eretmochelys imbricata Southeast U.S. Atlantic

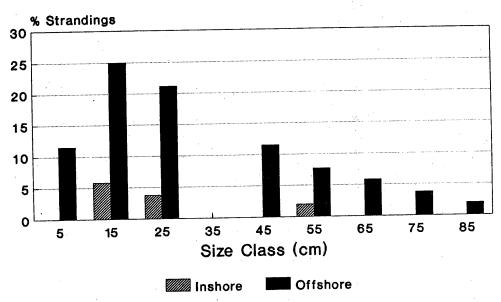
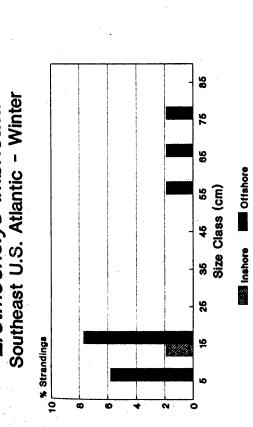


Figure 23. Size distribution of stranded hawksbills (Eretmochelys imbricata) on the southeast U.S. Atlantic coast, 1985 - 1991.

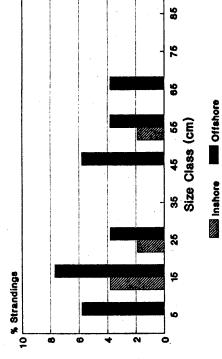
Table 14. Size distribution of stranded hawksbills (Eretmochelys imbricata) on the southeast U.S. Atlantic coast, 1985 - 1991.

					0.66-lb -m-	2.7
		Inshore			Offshore	<u> </u>
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent
0.0 - 9.9	0			6	7.6	11.5%
10.0 - 19.9	3	13.5	5.8%	13	16.5	25.0%
20.0 - 29.9	2	23.4	3.8%	11	22.3	21.2%
30.0 - 39.9	0			0		
40.0 - 49.9	0			6	46.2	11.5%
50.0 - 59.9	1	51.8	2.0%	4	55.1	7.7%
60.0 - 69.9	0			3	63.0	5.8%
70.0 - 79.9	0			2	72.2	3.8%
80.0 - 89.9	0			1	82.9	2.0%
Total	6		11.5%	46		88.5%

Eretmochelys imbricata Southeast U.S. Atlantic - Winter

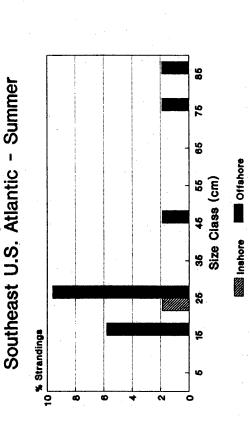


Southeast U.S. Atlantic - Spring Eretmochelys imbricata

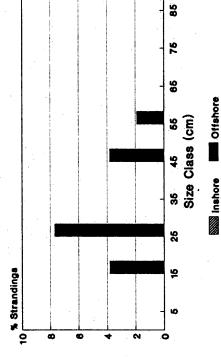


Eretmochelys imbricata Southeast U.S. Atlantic - Fall

Eretmochelys imbricata



Seasonal size distribution of stranded hawksbills (Eretmochelys imbricata) on the southeast U.S. Atlantic coast, 1985 - 1991. Figure 24.



Eretmochelys imbricata Eastern U.S. Gulf of Mexico

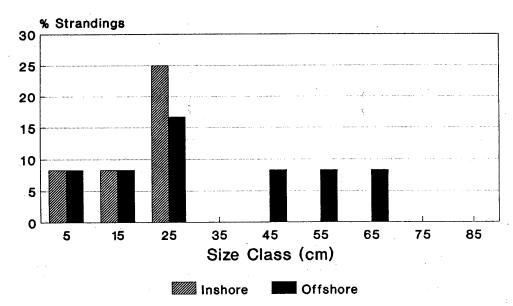
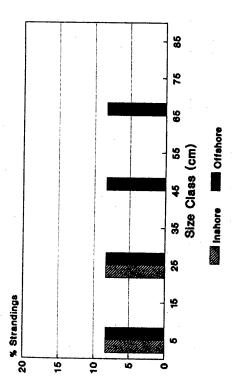


Figure 25. Size distribution of stranded hawksbills (<u>Eretmochelys</u> <u>imbricata</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

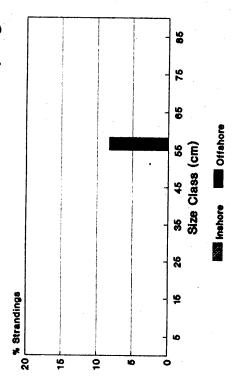
Table 15. Size distribution of stranded hawksbills (<u>Eretmochelys</u> <u>imbricata</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

		<u></u>					
	Inshore			Offshore			
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent	
0.0 - 9.9	1	6.1	8.3%	1	5.6	8.3%	
10.0 - 19.9	1	13.2	8.3%	1	17.0	8.3%	
20.0 - 29.9	3	25.9	25.0%	2	25.8	16.7%	
30.0 - 39.9	0			0			
40.0 - 49.9	0		·	1 .	45.7	8.3%	
50.0 - 59.9	0			1	50.4	8.3%	
60.0 - 69.9	0			1	66.4	8.3%	
70.0 - 79.9	0			0			
80.0 - 89.9	0			0			
Total	5		41.7%	.7		58.3%	

Eastern U.S. Gulf of Mexico - Winter Eretmochelys imbricata

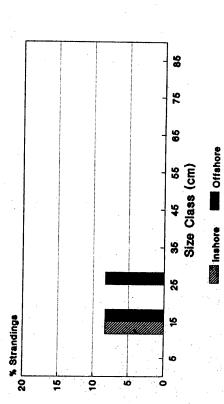


Eastern U.S. Gulf of Mexico - Spring Eretmochelys imbricata



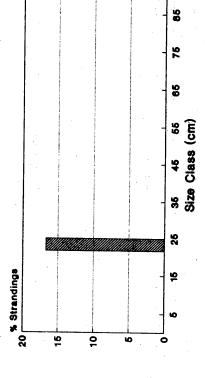
Eastern U.S. Gulf of Mexico - Fall Eretmochelys imbricata Eastern U.S. Gulf of Mexico - Summer

Eretmochelys imbricata



Seasonal size distribution of stranded hawksbills (Eretmochelys imbricata) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991. Figure 26.

inshore Offshore



Dermochelys coriacea Southeast U.S. Atlantic

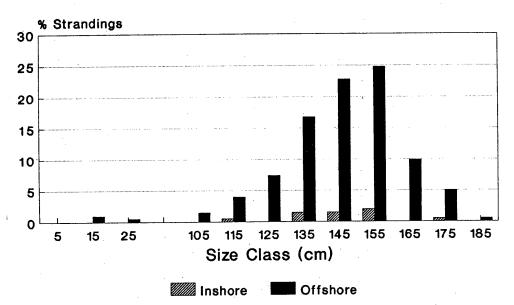
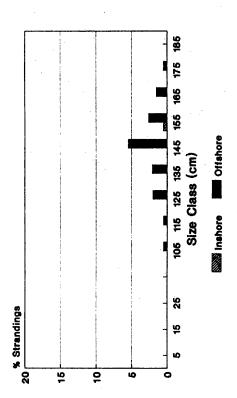


Figure 29. Size distribution of stranded leatherbacks (<u>Dermochelys</u> <u>coriacea</u>) on the southeast U.S. Atlantic coast, 1985 - 1991.

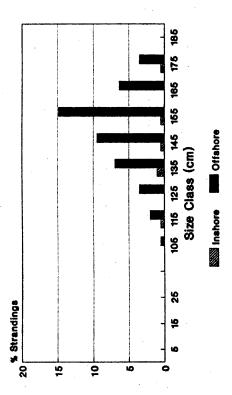
Table 17. Size distribution of stranded leatherbacks (<u>Dermochelys coriacea</u>) on the southeast U.S. Atlantic coast, 1985 - 1991.

	Inshore			Offshore			
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent	
0.0 - 9.9	0			. 0			
10.0 - 19.9	0			2	14.4	1.0%	
20.0 - 29.9	0			1	24.2	0.5%	
100.0 - 109.9	0			3	105.7	1.5%	
110.0 - 119.9	1	112.1	0.5%	8	116.4	4.0%	
120.0 - 129.9	0			15	124.8	7.4%	
130.0 - 139.9	3	134.1	1.5%	34	135.7	16.8%	
140.0 - 149.9	3	144.0	1.5%	46	145.5	22.8%	
150.0 - 159.9	4	152.5	2.0%	50	154.5	24.8%	
160.0 - 169.9	0			20	163.7	9.9%	
170.0 - 179.9	1	170.5	0.5%	10	172.5	5.0%	
180.0 - 189.9	0			1	183.8	0.5%	
Total	12		5.9%	190		94.1%	

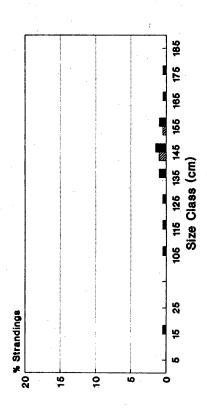
Dermochelys coriacea Southeast U.S. Atlantic - Winter



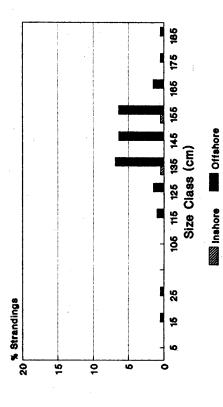
Dermochelys coriacea Southeast U.S. Atlantic - Spring



Dermochelys coriacea Southeast U.S. Atlantic - Summer



Dermochelys coriacea Southeast U.S. Atlantic - Fall



Seasonal size distribution of stranded leatherbacks (Dermochelys coriacea) on the southeast U.S. Atlantic coast, 1985 - 1991. Figure 30.

Offshore

Inshore

Dermochelys coriacea Eastern U.S. Gulf of Mexico

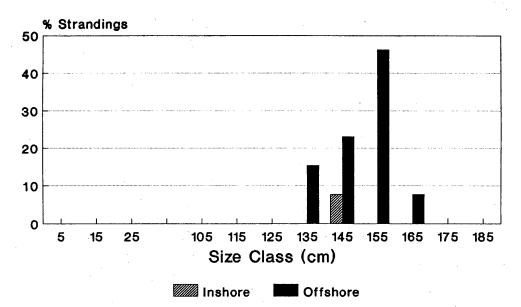
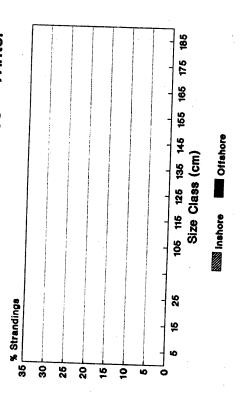


Figure 31. Size distribution of stranded leatherbacks (<u>Dermochelys</u> <u>coriacea</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

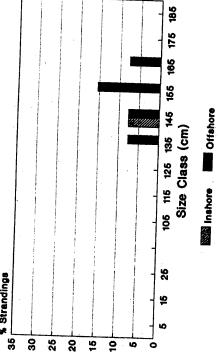
Table 18. Size distribution of stranded leatherbacks (<u>Dermochelys</u> <u>coriacea</u>) on the eastern U.S. Gulf of Mexico coast, 1985 - 1991.

			<u> </u>				
•	Inshore			Offshore			
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent	
0.0 - 9.9	0		,	0			
10.0 - 19.9	0			0			
20.0 - 29.9	0	e .		0			
100.0 - 109.9	0			0			
110.0 - 119.9	0			0			
120.0 - 129.9	0			0			
130.0 - 139.9	0			2	137.0	15.4%	
140.0 - 149.9	1	148.4	7.7%	3	146.3	23.1%	
150.0 - 159.9	0		·	6	153.5	46.2%	
160.0 - 169.9	0			1	168.0	7.7%	
170.0 - 179.9	0			0			
180.0 - 189.9	0			0			
Total	1	2	7.7%	_* 12		92.3%	

Dermochelys coriacea Eastern U.S. Gulf of Mexico - Winter



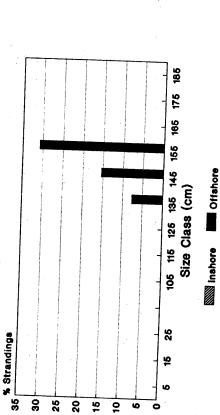
Dermochelys coriacea Eastern U.S. Gulf of Mexico - Spring



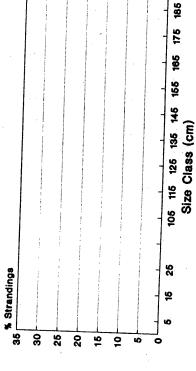
Dermochelys coriacea Eastern U.S. Gulf of Mexico - Fall

Eastern U.S. Gulf of Mexico - Summer

Dermochelys coriacea



Seasonal size distribution of stranded leatherbacks (<u>Dermochelys coriacea</u>) on the Inshore Offshore eastern U.S. Gulf of Mexico coast, 1985 - 1991. Figure 32.



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Dermochelys coriacea Western U.S. Gulf of Mexico

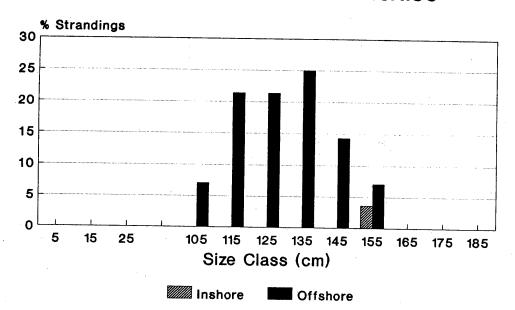


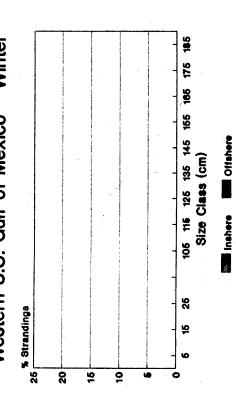
Figure 33. Size distribution of stranded leatherbacks (<u>Dermochelys</u> <u>coriacea</u>) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

Table 19. Size distribution of stranded leatherbacks (<u>Dermochelys</u> <u>coriacea</u>) on the western U.S. Gulf of Mexico coast, 1985 - 1991.

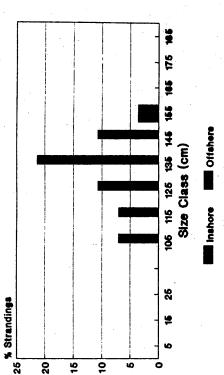
	Inshore			Offshore			
Size Class (cm)	Number	Mean (cm)	Percent	Number	Mean (cm)	Percent	
0.0 - 9.9	. 0			0			
10.0 - 19.9	0			0			
20.0 - 29.9	0			0	·		
100.0 - 109.9	0			2	106.2	7.1%	
110.0 - 119.9	0			6	117.0	21.4%	
120.0 - 129.9	0			6	126.1	21.4%	
130.0 - 139.9	0			7	135.6	25.0%	
140.0 - 149.9	0		·	4	145.8	14.3%	
150.0 - 159.9	1	156.6	3.6%	2	152.9	7.1%	
160.0 - 169.9	0			0			
170.0 - 179.9	0			0			
180.0 - 189.9	0			0			
Total	1		3.6%	27		96.4%	

Dermochelys coriacea Western U.S. Gulf of Mexico - Winter

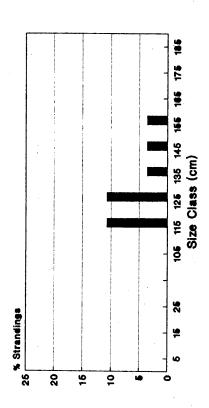
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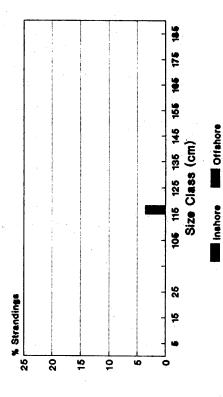
Dermochelys coriacea Western U.S. Gulf of Mexico - Spring



Dermochelys coriacea Western U.S. Gulf of Mexico - Summer



Dermochelys coriacea Western U.S. Gulf of Mexico - Fall



Seasonal size distribution of stranded leatherbacks (Dermochelys coriacea) on the western U.S. Gulf of Mexico coast, 1985 - 1991. Figure 34.

Inshere Offshore